Basic Terms: System Parts

- Kubernetes: The whole orchestration system
  - K8s "k-eights" or Kube for short
- Kubectl: CLI to configure Kubernetes and manage apps
  - Using "cube control" official pronunciation
- Node: Single server in the Kubernetes cluster
- Kubelet: Kubernetes agent running on nodes
- Control Plane: Set of containers that manage the cluster
  - Includes API server, scheduler, controller manager, etcd, and more
  - Sometimes called the "master"

Install Kubernetes Locally

- Kubernetes is a series of containers, CLI's, and configurations
- Many ways to install, lets focus on easiest for learning
- Docker Desktop: Enable in settings
  - Sets up everything inside Docker's existing Linux VM
- Docker Toolbox on Windows: MiniKube
  - Uses VirtualBox to make Linux VM
- Your Own Linux Host or VM: MicroK8s
  - Installs Kubernetes right on the OS

Kubernetes In A Browser

- Try http://play-with-k8s.com or katacoda.com in browser
  - Easy to get started
  - Doesn't keep your environment

Docker Desktop

- Runs/configures Kubernetes Master containers
- Manages kubectl install and certs
- Easily install, disable, and remove from Docker GUI

MiniKube

- Download Windows Installer from GitHub
- minikube-installer.exe
- minikube start
- Much like the docker-machine experience
- Creates a VirtualBox VM with Kubernetes master setup
- Doesn't install kubectl

MicroK8s

- Installs Kubernetes (without Docker Engine) on localhost (Linux)
- Uses snap (rather then apt or yum) for install
- Control the MicroK8s service via microk8s. commands
- kubectl accessable via microk8s.kubectl
- Add CoreDNS for services to work
  - microk8s.enable dns
- Add an alias to your shell (.bash_profile)
  - alias kubectl=microk8s.kubectl

Kubernetes Container Abstractions

- **Pod**: one or more containers running together on one Node
  - Basic unit of deployment. Containers are always in pods
- **Controller**: For creating/updating pods and other objects
  - Many types of Controllers inc. Deployment, ReplicaSet, StatefulSet, DaemonSet, Job, CronJob, etc.
- **Service**: network endpoint to connect to a pod
- **Namespace**: Filtered group of objects in cluster
- Secrets, ConfigMaps, and more

Kubernetes Run, Create, and Apply

- Kuberentes is evolving, and so is the CLI
- We get three ways to create pods from the kubectl CLI
  - > kubectl run (changing to be only for pod creation)
  - > kubectl create (create some resources via CLI or YAML)
  - > kubectl apply (create/update anything via YAML)
- For now we'll just use run or create CLI
- Later we'll learn YAML and pros/cons of each

Creating Pods with kubectl

- Are we working?

  > kubectl version
- Two ways to deploy Pods (containers): Via commands, or via YAML
- Let's run a pod of the nginx web server!

  > kubectl create deployment my-nginx --image nginx
- Let's list the pod

  > kubectl get pods
- Let's see all objects

  > kubectl get all

Pods -> ReplicaSet -> Deployment

Cleanup

- Let's remove the Deployment

  > kubectl delete deployment my-nginx

Scaling ReplicaSets

- Start a new deployment for one replica/pod

  > kubectl create deployment my-apache --image httpd

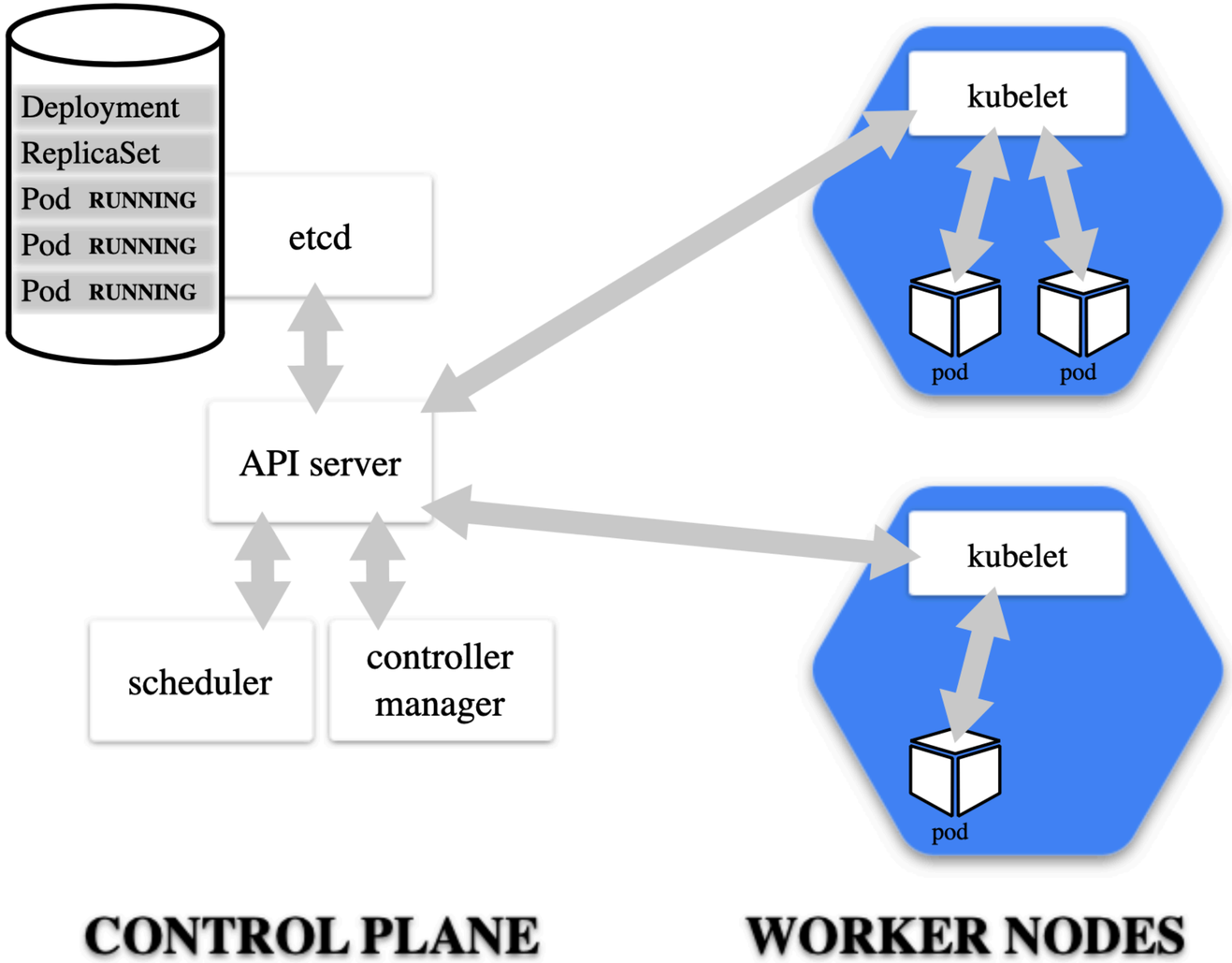
- Let's scale it up with another pod

  > kubectl scale deploy/my-apache --replicas 2

  > kubectl scale deployment my-apache --replicas 2

  - those are the same command
  - deploy = deployment = deployments

What Just Happened? kubectl scale



Don't Cleanup

- We'll use these httpd containers in the next lecture

Inspecting Deployment Objects

> kubectl get pods

- Get container logs

  > kubectl logs deployment/my-apache --follow --tail 1

- Get a bunch of details about an object, including events!

  > kubectl describe pod/my-apache-xxxx-yyyy

- Watch a command (without needing watch)

  > kubectl get pods -w

- In a separate tab/window

  > kubectl delete pod/my-apache-xxxx-yyyy

- Watch the pod get re-created

Cleanup

- Let's remove the Deployment

  > kubectl delete deployment my-apache